

09/960,013

2

PD-200164 (BOE 0176 PA)

In the Claims:

1. (Original) A subharmonic carrier-canceling apparatus for filtering out second order harmonics close to a local oscillator frequency from an incoming RF signal, said linearizer comprising:

a first splitter having a first splitter input, a first splitter I output, and a first splitter Q output, said first splitter input receiving said incoming RF signal, said first splitter separating said incoming RF signal into a first splitter in-phase (I) signal carried by said first splitter I output, and a first splitter quadrature (Q) signal carried by said first splitter Q output, wherein said first splitter Q signal is delayed 180 degrees behind said first splitter I signal;

a second splitter having a second splitter input, a second splitter I output, and a second splitter Q output, said second splitter input receiving a local oscillator signal, said second splitter separating said local oscillator signal into a second splitter in-phase (I) signal carried by said second splitter I output, and a second splitter quadrature (Q) signal carried by said second splitter Q output, wherein said second splitter Q signal is delayed 90 degrees behind said second splitter I signal;

a first subharmonic mixer coupled to said first splitter I output and said second splitter I output and receiving said first splitter I signal and said second splitter I signal, said first harmonic mixer generating a first mixer signal;

a second subharmonic mixer coupled to said first splitter Q output and said second splitter Q output and receiving said first splitter Q signal and said second splitter Q signal, said second harmonic mixer generating a second mixer signal; and

a combiner coupled to said first and second subharmonic mixers and receiving said first and second mixer signals, said combiner combining said mixer signals to generate an output RF signal having reduced second order harmonics close to said local oscillator frequency.

09/960,013

3

PD-200164 (BOE 0176 PA)

2. (Original) The subharmonic carrier-canceling apparatus for filtering out second order harmonics close to a local oscillator frequency from an incoming RF signal as recited in claim 1, wherein said first splitter comprises a microwave hybrid transformer.

3. (Original) The subharmonic carrier-canceling apparatus for filtering out second order harmonics close to a local oscillator frequency from an incoming RF signal as recited in claim 1, wherein said second splitter comprises a microwave hybrid transformer.

4. (Currently Amended) A subharmonic carrier-canceling apparatus for filtering out second order harmonics close to a local oscillator frequency from an incoming RF signal, said linearizer comprising:

a first splitter having a first splitter input, a first splitter I output, and a first splitter Q output, said first splitter input receiving a local oscillator signal, said first splitter separating said local oscillator signal into a first splitter in-phase (I) signal carried by said first splitter I output, and a first splitter quadrature (Q) signal carried by said first splitter Q output, wherein said first splitter Q signal is delayed 90 degrees behind said first splitter I signal;

a first subharmonic mixer coupled to said first splitter I output and receiving said first splitter I signal and said incoming [radio] RF signal, said first harmonic mixer generating a first mixer signal;

a second subharmonic mixer coupled to said first splitter Q output and receiving said first splitter Q signal, said second harmonic mixer generating a second mixer signal; and

a combiner coupled to said first and second subharmonic mixers and receiving said first and second mixer signals, said combiner combining said mixer signals to generate an output RF signal having reduced second order harmonics close to said local oscillator frequency.

5. (Original) The subharmonic carrier-canceling apparatus for filtering out second order harmonics close to a local oscillator frequency from an incoming RF signal as recited in claim 4, further comprising a second splitter

09/960,013

4

PD-200164 (BOE 0176 PA)

having a second splitter input, a second splitter I output, and a second splitter Q output, said second splitter input receiving said incoming RF signal, said second splitter separating said incoming RF signal into a second splitter in-phase (I) signal carried by said second splitter I output, and a second splitter quadrature (Q) signal carried by said second splitter Q output, wherein said second splitter Q signal is delayed 180 degrees behind said second splitter I signal;

6. (Original) The subharmonic carrier-canceling apparatus for filtering out second order harmonics close to a local oscillator frequency from an incoming RF signal as recited in claim 4, wherein said first splitter comprises a microwave hybrid transformer.

7. (Original) The subharmonic carrier-canceling apparatus for filtering out second order harmonics close to a local oscillator frequency from an incoming RF signal as recited in claim 5, wherein said second splitter comprises a microwave hybrid transformer.

8. (Original) A satellite communications system, comprising:  
a ground station;  
a satellite in orbit and in communication with said ground station, said satellite having a subharmonic carrier-canceling apparatus for filtering out second order harmonics close to a local oscillator frequency from an incoming RF signal comprising:

a first splitter having a first splitter input, a first splitter I output, and a first splitter Q output, said first splitter input receiving said incoming RF signal, said first splitter separating said incoming RF signal into a first splitter in-phase (I) signal carried by said first splitter I output, and a first splitter quadrature (Q) signal carried by said first splitter Q output, wherein said first splitter Q signal is delayed 180 degrees behind said first splitter I signal;

a second splitter having a second splitter input, a second splitter I output, and a second splitter Q output, said second splitter input receiving a local oscillator signal, said second splitter separating said local oscillator signal into a second splitter in-phase (I) signal carried by said second splitter I output, and a

09/960,013

5

PD-200164 (BOE 0176 PA)

second splitter quadrature (Q) signal carried by said second splitter Q output, wherein said second splitter Q signal is delayed 90 degrees behind said second splitter I signal;

a first subharmonic mixer coupled to said first splitter I output and said second splitter I output and receiving said first splitter I signal and said second splitter I signal, said first harmonic mixer generating a first mixer signal;

a second subharmonic mixer coupled to said first splitter Q output and said second splitter Q output and receiving said first splitter Q signal and said second splitter Q signal, said second harmonic mixer generating a second mixer signal; and

a combiner coupled to said first and second subharmonic mixers and receiving said first and second mixer signals, said combiner combining said mixer signals to generate an output RF signal having reduced second order harmonics close to said local oscillator frequency.

9. (Original) The satellite communications system as recited in claim 8, wherein said first splitter comprises a microwave hybrid transformer.

10. (Original) The satellite communications system as recited in claim 8, wherein said second splitter comprises a microwave hybrid transformer.

11. (Original) A satellite communications system, comprising:

a ground station;

a satellite in orbit and in communication with said ground station, said satellite having a subharmonic carrier-canceling apparatus for filtering out second order harmonics close to a local oscillator frequency from an incoming RF signal comprising:

a first splitter having a first splitter input, a first splitter I output, and a first splitter Q output, said first splitter input receiving a local oscillator signal, said first splitter separating said local oscillator signal into a first splitter in-phase (I) signal carried by said first splitter I output, and a first splitter quadrature (Q) signal carried by said first splitter Q output, wherein said first splitter Q signal is delayed 90 degrees behind said first splitter I signal;

09/960,013

6

PD-200164 (BOE 0176 PA)

a first subharmonic mixer coupled to said first splitter I output and receiving said first splitter I signal and said incoming radio signal, said first harmonic mixer generating a first mixer signal;

a second subharmonic mixer coupled to said first splitter Q output and receiving said first splitter Q signal, said second harmonic mixer generating a second mixer signal; and

a combiner coupled to said first and second subharmonic mixers and receiving said first and second mixer signals, said combiner combining said mixer signals to generate an output RF signal having reduced second order harmonics close to said local oscillator frequency.

12. (Original) The satellite communications system as recited in claim 11, further comprising a second splitter having a second splitter input, a second splitter I output, and a second splitter Q output, said second splitter input receiving said incoming RF signal, said second splitter separating said incoming RF signal into a second splitter in-phase (I) signal carried by said second splitter I output, and a second splitter quadrature (Q) signal carried by said second splitter Q output, wherein said second splitter Q signal is delayed 180 degrees behind said second splitter I signal;

13. (Original) The satellite communications system as recited in claim 11, wherein said first splitter comprises a microwave hybrid transformer.

14. (Original) The satellite communications system as recited in claim 12, wherein said second splitter comprises a microwave hybrid transformer.